

Species

23(71), 2022

To Cite:

Raju AJS, Srikanth P. Pigeon berry, *Duranta repens* L. (Verbenaceae): a key food source for bees and butterflies. *Species*, 2022, 23(71), 322-325

Author Affiliation:

Department of Environmental Sciences, Andhra University,
Visakhapatnam 530 003, India

***Corresponding author:**

A.J. Solomon Raju, Mobile: 91-9866256682
Email:solomonraju@gmail.com

Peer-Review History

Received: 05 April 2022

Reviewed & Revised: 11/April/2022 to 12/June/2022

Accepted: 14 June 2022

Published: 18 June 2022

Peer-Review Model

External peer-review was done through double-blind method.



© The Author(s) 2022. Open Access. This article is licensed under a [Creative Commons Attribution License 4.0 \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

Pigeon berry, *Duranta repens* L. (Verbenaceae): a key food source for bees and butterflies

Solomon Raju AJ, Srikanth P

ABSTRACT

Duranta repens is a perennial evergreen woody shrub. It flowers and fruits massively during wet season and sparsely during other seasons. The flowers are hermaphroditic, very attractive and offer both pollen and nectar for flower-visiting insects. The bees and butterflies utilize this plant species as an important food source during wet season. These insects pay legitimate visits to collect the forage and invariably effect pollination while probing the flowers. Therefore, *D. repens* is a promising candidate as a hedge plant and also in landscape development. It supports a variety of insects by providing pollen and/or nectar throughout the year.

Keywords: *Duranta repens*, pollen, nectar, bees, butterflies

1. INTRODUCTION

Insects utilize different plant species available in their habitats as source of pollen and/or nectar. But their visits to flowers are dictated by floral architecture and morphological characters such as size, shape and color of floral parts. Plants display two classical pollination strategies, generalization and specialization; both strategies affect their reproductive efficiency. A generalist plant species produces flowers with simple floral structure which allows for pollination by a variety of pollinator insects/animals. In this pollination strategy, this plant species most likely to receive hetero-specific pollen because pollinators alternately also visit several other plant species flowering simultaneously in the same locality (Scopece et al. 2010). Specialist plants allow only a particular class or a small range of pollinators and receive own pollen to a greater extent than the generalist plant species. But, this situation is not the rule and is subject to the situation of plant species flowering simultaneously and the pollinator species occurring in the locality. Futuyma and Moreno (1988) reported that generalist species occupy diverse environments while specialist species are closely associated with a given environment. From ecosystem point of view, the generalist plants are very important as they provide food for a variety of local insect species and in this interaction, both plants and insects benefit each other. It is in this context, the present study has been attempted to report on the importance of an exotic generalist plant species, *Duranta repens* as a chief source of pollen and nectar for a variety of insect species. This plant species is cultivated as an

ornamental and as hedge plant in rural and urban areas. In cities, this plant species is commonly used as a hedge plant for the beautification of parks and gardens. The side effect of its cultivation is that it provides ample food for a wide array of insect species.

2. MATERIALS AND METHODS

Duranta repens cultivated as hedge plant at the residential quarters of Andhra University campus, Visakhapatnam was used for this study conducted during May 2021 to January 2022. It is a perennial evergreen woody shrub in which gradual leaf shedding and flushing occurs continuously throughout the year. The flower-opening time was recorded by tagging fifteen inflorescences on different plants. The inflorescence type, the pattern of flower production and floral characters recorded were evaluated in relation to the probing behavior of flower-visitors to collect forage and effect pollination. The forage collection time of flower-visitors was recorded. The importance of this plant species as food source for flower-visitors was briefly explained. Field study indicated that this plant species is very important as a hedge plant and in the process, it supports a variety of insects, especially bees and butterflies by providing pollen and/or nectar.

3. OBSERVATIONS

It is an evergreen woody shrub displaying flowering and fruiting throughout year. The inflorescence is a raceme which is borne in leaf axils and terminally (Figure 1a). The flowers are small, blue to lavender, tubular, bisexual, nectariferous and zygomorphic. The flowers are open daily at 0630-0700 h. The calyx is green and connate basally with 5 valvate lobes distally. The corolla is tubate with 5 lobes distally. The stamens are 4, didynamous and epipetalous, inserted at the middle portion of the corolla tube. The ovary is 4-carpelled, each carpel with a single locule which hosts a single ovule. The style is small with a minutely capitate 4-lobed stigma. The flowers remain in place for a short period and fall off on the same day.



Figure 1. *Duranta repens*: a. Flowering branch, b. *Apis dorsata*, c. & d. *Apis cerana*, e. *Anthophora cingulata*, f. & g. *Megachile* sp., h. *Xylocopa latipes*, i. *Xylocopa pubescens*, j. *Eumenes* sp., k. *Chrysomya megacephala*.

The flowering is very profuse during wet season while it is sparse in other seasons. In wet habitats, the flowering and fruiting events continue prolifically throughout the year. The racemose inflorescence with a number of closely spaced flowers is quite attractive from a long distance. The floral attraction is further amplified by the production of a number of inflorescences terminally and in leaf axils. The flowers were visited by bees, a wasp, a fly and butterflies. The bees were *Apis dorsata* (Figure 1b), *A. cerana* (Figure 1c, d), *Anthophora cingulata* (Figure 1e), *Megachile* sp. (Figure 1f, g), *Xylocopa latipes* (Figure 1h) and *X. pubescens* (Figure 1i). The wasp was *Eumenes* sp. (Figure 1j) and the fly was *Chrysomya megacephala* (Figure 1k). The butterflies included the papilionid *Graphium Agamemnon* (Figure 2a), the pierids *Catopsilia pyranthe* (Figure 2b), *Eurema hecabe* (Figure 2c), the nymphalids *Junonia lemonias* (Figure 2d), *Hypolimnys misippus* (Figure 2e, f), *Danaus chrysippus* (Figure 2g), *Hypolimnys bolina* (Figure 2h), the hesperiid *Borbo cinnara* (Figure 2i) and the diurnal hawk moth *Macroglossum gyrans* (Figure 2j). Among bees, *Xylocopa* species collected only nectar while all others collected both pollen and nectar. The wasp, the fly and all butterflies collected only nectar from the flowers.

All insect species visited the flowers legitimately from the flower front. The short corolla tube with anthers placed at the corolla throat facilitated all insect species to collect the forage with great ease. The didynamous condition of stamens involving a pair of long and a pair of short stamens provided a differential access to pollen for pollen collecting bees. The long stamens with their anthers placed at the throat provided easy access to pollen by bees when compared to short stamens which are placed below inside the corolla. The study showed that all insect species visited the flowers regularly and consistently throughout the day during wet season. But, these species were not regular and consistent in their visits to the flowers of this plant when flowering is sparse. Therefore, *D. repens* is an important forage source for a guild of insects in the localities where this plant grows on its own or is cultivated.

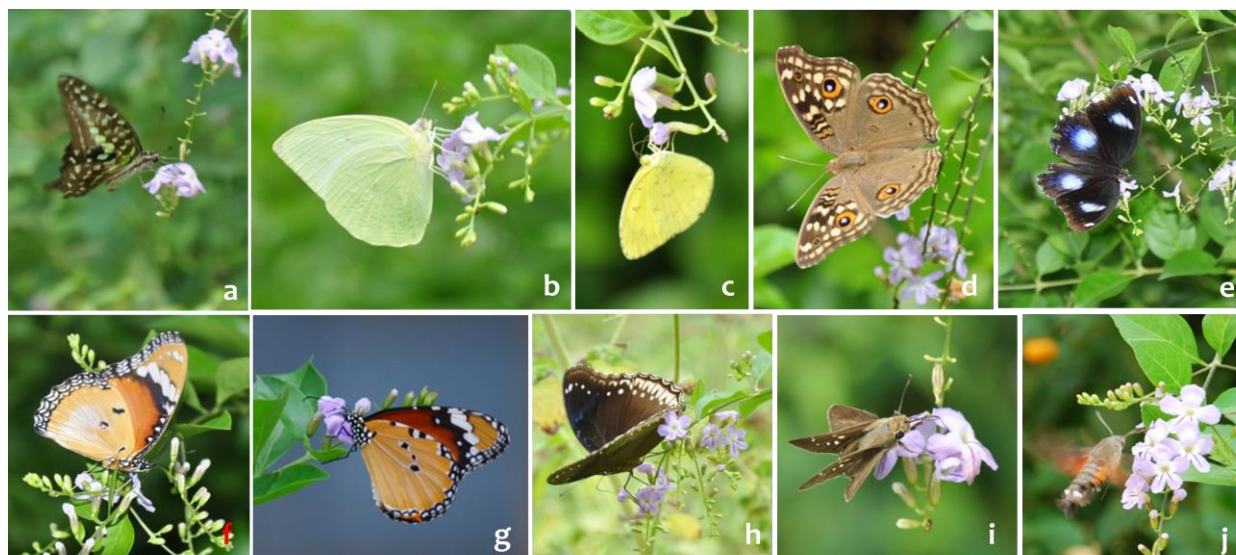


Figure 2. *Duranta repens*: a. Papilionid butterfly, *Graphium agamemnon*, b. & c. Pierid butterflies -b. *Catopsilia pyranthe*, c. *Eurema hecabe*, d-h. Nymphalid butterflies – d. *Junonia lemonias*, e. *Hypolimnas misippus* (male), f. *Hypolimnas misippus* (female), g. *Danaus chrysippus*, h. *Hypolimnas bolina* (female), i. Hesperiid butterfly, *Borbo cinnara*, j. Diurnal hawkmoth, *Macroglossum gyrans*.

4. DISCUSSION

Floral traits are important for visitation by flower-visiting insects. The position of inflorescence and arrangement of flowers and floral traits individually and collectively provide indications of the presence of food resource for insects. The horizontal to erect position of flowers and their close arrangement from each other on the same inflorescence provide a flat-topped alighting platform for the visiting insects. Since many inflorescences bloom every day on the same plant and individual inflorescences present flowers in close aggregation, the insects visiting the flowers have the advantage of reducing the flight time and search time and of collecting ample amount of food in a short span of time and hence this form of floral resource advertisement is energetically profitable for them. In this study, different insect species, especially bees and butterflies use *D. repens* as an important food source during wet season which lasts for about 5-6 months. Further, *D. repens* is a potential source of food for these insects because it is often planted as hedge plant and also as an ornamental in urban parks and gardens. In rural areas also, it is occasionally used as fencing plant around traditional houses. Meera Bai (1987) reported that *D. repens* is not visited by nymphalid butterflies. But, in this study, it is found that nymphalid butterflies do visit the flowers of *D. repens* and use this plant as a promising nectar source.

The study recommends that *D. repens* should be used as a hedge plant in city parks, gardens and lawns for beautification and landscape development. Its prolific growth and massive flowering supports a wide array of flower-visiting insect species for a long period of time in its cultivated localities, especially in urban areas where vegetation is scarce.

5. CONCLUSION

Duranta repens is a perennial evergreen woody shrub that flowers and fruits throughout the year with profuse flowering and fruiting during wet season. The flowers are attractive, bisexual and offer both pollen and nectar for flower-visiting insects. The bees and butterflies exhibit floral fidelity to this plant species during wet season. These insects visit the flowers legitimately to collect the forage and invariably effect pollination while probing the flowers. Therefore, *D. repens* is a promising candidate as a

hedge plant and also in landscape development. It supports a variety of insects by providing pollen and/or nectar throughout the year.

Authors contributions:

Both authors contributed equally.

Funding

This study has not received any external funding.

Ethical approval

Duranta repens was cultivated & observed at the residential quarters of Andhra University campus, Visakhapatnam, India. The ethical guidelines are followed in the study for sample collection & identification.

Conflicts of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Futuyma, D.J. and Moreno, G. 1988. The evolution of ecological specialization. *Ann. Rev. Ecol. Syst.* 19: 207-233.
2. Meera Bai, G. 1987. The ecology of butterflies and their role in natural pollination of plants at Visakhapatnam, A.P. India. Ph.D. Thesis, Andhra University, Visakhapatnam.
3. Scopece, G. Salvatore, C., Stephen, D.J. and Florian, P.S. 2010. Pollination efficiency and the evolution of specialized deceptive pollination systems. *Am. Nat.* 175: 98-105.